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REPORTING ON THE
BUSINESS SIDE OF
OPTICAL, ELECTRO-OPTICAL
OPTOELECTRONIC, LASER
AND PHOTOGRAPHIC
TECHNOLOGY

Optical Engineering BULLETIN

And Bi-Monthly Source Guide

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Expert Says Experience Still Needed in Optics

With NASA cutbacks and the slowdown in aerospace, many experienced people over 45 are finding themselves unemployed. But there are still jobs available to qualified applicants of all ages, according to a top management consultant. William E. Coleman, Ph.D., President of Coleman and Associates of Los Angeles, has some practical suggestions for finding employment in today's market.

It's an advantage to be willing to relocate. Some areas offer better opportunities, including Texas, Minnesota, Illinois, Wisconsin, Kentucky, and Virginia. Also, a person should be flexible, perhaps to accept work with less challenge, less status, and less pay. Every job offers the opportunity to move back up the ladder.

The applicant should determine which of his demonstrated skills are most marketable and identify specific organizations that can best utilize those skills. Public libraries have excellent reference publications for this purpose, including Standard and Poors Manufacturers Directory. Company brochures, annual reports, and product literature enable the applicant to become familiar with the organization he intends to contact.

There's nothing wrong with making use of acquaintances or business associates. A personal recommendation can be very valuable in getting an interview, while unsolicited resumes or letters seldom are effective. Sending an unsolicited resume should be a last-resort effort. It is wise to avoid firms that widely disseminate resumes without the applicant's knowledge or permission. Some companies avoid people who are referred by employment agencies, and they prefer not to pay the required fees. A professional recruiting organization is better; these are often retained by corporations to find people for specific positions in a particular field.

(Continued on Page 2)

Technical Forecasting Offers Both Pitfalls and Opportunities

It is a generally accepted rule that "the future lies with those who plan for it," and the business or industry that plans intelligently for the future usually stays well ahead of its competition. Future planning for a technically oriented company, however, can be complex and sometimes very expensive if it directs the company along unprofitable paths.

The term "technological forecasting" came into use a few years ago, and it became immediately attractive to industry and government. It was discovered, however, that such forecasting was not amenable to becoming a refined art, and many who tried it became disillusioned. Others learned to use technological forecasting as a potent tool in making better decisions and allocating funds for future projects. The general result has been that systematic forecasting has not been widely accepted by industry, but it is used extensively by government agencies and the military.

A recent survey of technological forecasting shows that more segments of

private industry are now learning to use it effectively as a guide for decision making. Advocates of forecasting see it as the only logical way for a business to formulate goals for the future, implement plans to achieve these goals, and designate funds for specific programs.

Colonel Joseph Martino, research scientist at the University of Dayton, has stated: "...there is no alternative to forecasting. Every decision made by a company necessarily exposes resources to the uncertainties of the future and, therefore, carries a forecast within it, implicitly if not explicitly. The company cannot choose to not forecast. The only choice the company has is whether it will do its forecasting well or poorly."

There are several definitions of technological forecasting. One describes it as "a prediction, based on known facts, of a technical achievement by defined methods within a stated time." Such forecasting takes into consideration future needs, the probabilities of success, the methods of achieving a goal, and the required funding. (Continued on Page 5)

Federal Financing Offers Opportunity for Small Business to Expand

When a company wishes to expand, it must decide whether to buy, build, or lease. Most importantly, it must decide how to finance the expansion, and for small technical companies this can be a major problem.

A specialist in small business financing, Robert E. Sanders, believes that the financial problems of most small technical companies result from the lack of a realistic business plan. Mr. Sanders is president of Sanders & Company, Invest-

ment Bankers, Santa Monica, California. He points out that these small technical companies usually sell to the government or other slow-paying customers, they are often managed by engineers with limited financial knowledge, and their credit is generally not AAA. They normally don't look for financing until they actually need it, which may be too late. Such things as cash flow, products, markets, what share of the market to capture, and the like, should all be

(Continued on Page 4)

GOVT. BUILDING-LOAN for small business



The SBA's Job Is To Keep Small Businesses Healthy

Small and medium-size businesses are probably missing a good bet if they are not taking advantage of the many services offered by the Small Business Administration. The SBA is authorized by Congress to provide assistance in such areas as financing, management, foreign trade, technology utilization, and procuring government business. It also offers publications and learning aids in many different areas of business expertise.

The SBA's consulting program includes a national staff of engineers to assist in business problems. Members of the Service Corps of Retired Executives act as consultants for this program, and the sources of research include NASA, AEC, and the Patent Office.

Working with local banks, the SBA can guarantee loans for 10 and sometimes 15 years, as well as financing new business ventures. The SBA will either participate with a bank on a loan, guarantee 90% of the loan, or even lend the entire amount if funds are available. For a company with an assignable contract, the SBA can guarantee a line of credit for acquisition of labor and materials. In the event of relocation, the SBA can guarantee a lease up to 20 years. For financing purposes, the SBA defines a small manufacturing business as having 250-1500 employees, depending on the industry.

The SBA offers a diversified program of management and technical assistance to strengthen small firms and to improve their operations. Management conferences generally run one day and cover such subjects as working capital, business forecasting, and diversification of markets. Evening management courses deal with planning, organization, and control of a business. Workshops are conducted on capital requirements, sources of financing, types of organization, and choice of location. SBA clinics cover the specific problems of the small businessman in a particular industry.

In the area of technology utilization, the SBA provides personnel and information that will help a business improve its competitive position and increase its profits through the successful application of new technology. Experts are available to show the businessman how to exploit the latest developments in materials, equipment, and processes.

It is also the SBA's job to insure that small businesses get a fair share of government contracts. Specialists are available to counsel the businessman on prime contracting and subcontracting. They will direct the small business to appropriate government agencies and help to get the

company's name on bidders lists. Major government agencies "set aside" contracts or portions of contracts specifically for small business bidding. The SBA has its own procurement representatives in military and civilian installations to act in behalf of the small business.

To increase small business participation in export trade, the SBA works closely with the Department of Commerce and other agencies, generating export activity and furnishing information on export opportunities.

Survey Shows Higher Pay for Technicians

Salaries of engineering technicians increased on the average by 13.6% between 1973 and 1975, according to recent survey results published by the Engineering Manpower Commission of Engineers Joint Council. The biennial survey, based on data from 630 employers and covering over 61,500 technicians, showed that the "average" engineering technician has had about 14½ years of experience since leaving school, is about 34 years old, and is earning \$12,200 a year.

Actually, the "average" technician is only a statistical abstraction, as real technicians receive a wide range of salaries depending on their level of education, industry group, geographical location, level of responsibility, and individual performance. Graduates of 2-year junior college and technical institute programs start out with average salaries about \$1,700 per year more than nongraduates of the same age. The differential between graduates and nongraduates diminishes as technicians gain on-the-job training and knowledge, and it becomes insignificant after about 15 years of experience.

The highest-paid group among engineering technicians and technologists is made up of graduates of four-year bachelor of technology programs. Median salaries for these graduates started at \$10,500 annually, \$1,750 above the median for 2-year graduates and \$3,450 more than nongraduate beginners.

Expert says

(Continued from Page 1)

A neat, error-free resume is essential—one that is easy to read and not over three pages. When jobs are summarized, they should discuss responsibilities, not duties. In listing education, it's not necessary to go below college level. Hobbies, health status and references should not be included, nor is it advisable to employ fancy covers or other packaging niceties.

In spite of laws and regulations to the contrary, there are areas of discrimination in hiring. The applicant should recognize that employer resistance may have to be approached with concise explanations for such things as: no technical degree, long-term unemployment, frequent job changes, health problems, and brushes with the law, as well as the prime obstacle—being over 45.

The interview, of course, is very important. The prepared applicant is familiar with the company and, perhaps, with the people in it. He answers questions briefly and confidently, and he confines his own questions to such things as company objectives, challenges, etc. He does not ask about fringe benefits, work hours, parking, and the like.

There is always the possibility, of course, that a person's skills are no longer marketable and that it will be necessary to consider a change of careers. In this case, it is essential to seek sound counseling. Most universities have vocational counseling services that are as good or better than those of career-guidance agencies which charge up to \$4000 for advice.

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The Pressure is on the Seller in Today's Market

The old expression "let the buyer beware" has lost much of its impact in our consumer-oriented society, and all indications are that the seller should be the one to exercise caution.

There is, in fact, a bewildering number of agencies and organizations that are ready and willing to come to the aid of the customer...offering safeguards against misleading advertising and products that do not live up to their claims.

Federal agencies provide licensing and monitoring of manufacturers. They handle consumer complaints, and when necessary, they represent a customer in legal action against a manufacturer. Besides these government agencies, and other local entities, there are consumer "help lines" and services on radio and television throughout the country.

Government agencies will even file class action suits in situations where there are a number of dissatisfied customers. For the indigent, there is help through Legal Aid; and for claims below \$500, there is inexpensive help through Small Claims Court.

The buyer's major problem, apparently, is deciding where to make his complaint. In some instances, city, county, and state agencies duplicate each other's services. Usually, the customer's first action is to approach the seller directly, with a statement of the grievance. And in most instances, this is all that is needed since most of today's reputable companies will correct a mistake or defect. If the customer does not obtain satisfaction, it will then be necessary to decide which agency has jurisdiction.

The Federal Trade Commission, for example, may be the place to complain if the offending company is engaged in interstate commerce. The FTC screens individual complaints and either recommends an investigation or suggests that the individual contact a civil attorney. Usually, a company will act quickly to correct a problem if the FTC begins a preliminary investigation. If necessary, the FTC will carry its actions through the processes of a formal order and prosecution by trial.

The FTC also investigates fraudulent advertising complaints which arise from either its own monitoring activities or from the experience of consumers or other entities.

Help is also available to a consumer through the Attorney General's office at the State Capital. In California, the individual can call toll-free and a form will be sent for detailed information about the complaint. The completed

form is submitted to the offending company which is given time to respond.

The Attorney General's office is more likely to take action where there is evidence of fraud, and it will file a civil action suit on behalf of the consumer.

The basic procedures of all consumer-help agencies tend to give a company or manufacturer the opportunity to correct a problem before any action is taken. The laws are designed to offer protection to both parties, whether buyer or seller. However, it is a good policy for the seller to recognize that in today's marketplace, the customer has a significant amount of sympathy and support.

California Businesses Can Benefit from New Technology Resources

Small businesses located in five counties of Southern California who are experiencing problems with growth and profits can now benefit from the Federal Government's storehouse of knowledge and experience. The technology acquired from research and development programs constitutes a valuable resource that can help business operations plagued with rising production costs, shortages of energy, material and labor, and other problems involved with production, marketing, and competition.

The government-funded Technology Information Sources Center (TISC) is making this information and assistance available to businesses in Los Angeles, Orange, Ventura, Riverside, and San Bernardino counties. The TISC was established by the Los Angeles Chamber of Commerce under a grant from the Department of Commerce. It has a staff of experts throughout the five-county area to: 1) make formal presentations to requesting companies, 2) help managers pinpoint areas where assistance is needed, and 3) locate pertinent information within the government inventory.

The resources of technology, knowledge and experience obtained from military and space programs is valued at \$250 billion. One of the tasks of the TISC is to make small businesses aware of the ways they can benefit from these new technologies. The TISC serves primarily as a communications link between private industry, the government, and small business. When a company cannot make its own analysis of problems, the TISC will recommend consultants and assist the company in acquiring needed information.

Chamber of Commerce economists estimated that maximum use of this new technology by Southern California manufacturers would increase producti-

vity by 20 percent and create approximately 500,000 new jobs. The program is expected to help combat inflation and unemployment, and increase exports. A spokesman of the UCLA Graduate School of Management noted that only about 20-25 percent of past growth in the U.S. economy is attributed to increases in capital and labor. The greatest growth results from more productive use of technology, knowledge and management resources.

This is the first time Chambers of Commerce have been involved in transmitting Federal technology to private enterprise. It is the outgrowth of a program started in 1973 by the Los Angeles Chamber. A Technology Use Task Force was formed with members from business, communications, government, education, journalism, engineering, and science. Its functions are to:

- 1) Evaluate the effectiveness of a technology transfer program.
- 2) Make industry aware that this information is available.
- 3) Cooperate with trade associations, technical societies, and Chambers of Commerce to transfer technology.
- 4) Assess the impact of the program on the economy and employment.
- 5) Compile data on the methods and results of technology transfer.
- 6) Investigate sources of financing.
- 7) Communicate with high-technology companies, federal laboratories, and educational institutions.

Information and assistance can be obtained through TISC offices at any Chamber of Commerce in the five counties. In Los Angeles, the office is located at 404 S. Bixel Street. Telephone information can be obtained from Ralph Lamm (213) 629-0704, or Norman Lynn (213) 629-0724.

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FEDERAL FINANCING

(Continued from Page 1)

planned at least a year in advance.

Small companies in the development stage with low-volume sales and marginal profits find it hard to get long-term financing for expansion. They also realize that it is not realistic to tie up their capital in facilities. Many companies faced with this problem have found that the best, and perhaps only, solution is to utilize the Small Business Administration's 502 Program.

Under the Small Business Investment Act of 1958, the Federal Government provides for long-term financing for small business expansion. A company can have a building constructed to its own specifications and lease it back for 20 or 25 years, with an option for later purchase. A company can find out if it qualifies for this program by submitting a financial statement to an investment company for review.

SBA 502 loans may be used to finance construction, modernization, or conversion of plants, including the purchase of land, machinery and equipment. A loan may also be used for working capital or debt repayment, except for interim debt incurred for construction of the project. The small business must be an identifiable concern, and the loan must be for a sound business purpose. For loan eligibility, a small business is defined as:

- 1) independently owned and operated,
- 2) not dominant in its field, and
- 3) within the SBA's established size standards.

A business is classified as small if it has 250 employees or less. A company with 1500 or more employees is considered as large, and companies with employees between 250 and 1500 fall under special rules with certain prescribed conditions. An alternative standard for determining if a company is small is that the business, with its affiliates, should not exceed \$7.5 million in assets, with a net worth not to exceed \$2.5 million. Average net income, after federal income taxes, for the preceeding two years, should not have exceeded \$250,000.

To qualify for a 502 loan, the company must also produce certified evidence that the required financing is not available through private sources. All SBA loans must be secured to assure repayment.

The interest rate on SBA's share of a loan is the published rate. When banks or other lenders participate with SBA, they may charge a reasonable, legal rate on their share. Maximum interest rates on SBA guaranteed loans are published quarterly and are available from SBA field offices.

SBA loan maturities may not exceed

25 years plus the estimated time required to complete the plant construction, conversion or expansion. Loan maturities are customarily based on ability to repay, together with the nature and estimated useful life of the collateral offered as security for the loan. Repayments of principal are usually made in equal monthly installments, but in certain cases quarterly or seasonal payments can be authorized. Monthly payments of interest on the unpaid principal balance are required regardless of the amortization schedule authorized for the loan principal.

The Real Estate Development Program of Robert E. Sanders and Company has as its basis direct funds and guarantees provided by the Federal Government to Teak, a local development company qualifying under Section 502 of the Small Business Investment Act of 1958, as amended.

The local development program was instituted to "make loans to qualified development companies for use in assisting specific small businesses to construct, modernize or expand their plants and to include the purchase of land and acquisition of fixed machinery and equipment."

Size standards for this program, as stated by the Federal Government, define a small business as one which, together with its affiliates:

1. Has total assets of no more than \$9 million
2. Net worth not to exceed \$4 million
3. Profits after taxes should not exceed \$400,000, based on a two-year average and computed without benefit of any carryover loss.

Guidelines for the Teak program specify that "The local development company may contract for a small business concern's use of a facility, by any of the following methods:

1. Leasing the facility to the small business with option to purchase.
2. Leasing the facility to the small business, without option to purchase, for up to a twenty-five year period.
3. Selling to the small business the completed facility.

Contracts involving leases must provide that the small business lessee be given the right to occupy the facility, either for the term of the loan or for a period of five years, after completion of construction.

The local development company, upon receipt of government funds, will issue contracts for the construction of the required facility, according to specifications of the small business concern. The term of the lease is set for a period of not less than five years but no more than twenty-five years. The rate for the lease is set at approximately 11% per year based on the total cost of the project, triple net."

Robert E. Sanders & Co., agents for Teak, require that applicants for this program should:

1. Submit their application with credit and financial statements, for review and approval.
2. Set up a contractual relationship with Teak.
3. Deposit refundable "good faith" currency, made up of the last three months' rent plus one-half of one month's rent as a security deposit.
4. Based on the information supplied by the applicant, Sanders will then prepare and submit a formal proposal to the Federal Government for approval.
5. Upon receipt of approval and funds from the Federal Government, the Teak local development company will close escrow on the property and commence construction.
6. Should the applicant default or withdraw from the contract, prior to the awarding of government funds, \$2,500 of the deposit money is forfeited.
7. The entire lease deposit is forfeited if the applicant withdraws from the contract after government funds have been awarded.
8. If the local development company fails to perform, at any stage during the agreement, the applicant's deposit is refunded with the exception of \$2,500 in administrative costs.
9. The lease document, as signed by the applicant on the facility, is a flat payment lease with an option that entitles the applicant to purchase the property for the term of the lease, subsequent to five years.
10. The lease agreement on the facility is a triple net lease, leaving the lessee responsible for maintenance, insurance and taxes.

A deposit of \$2,500 is payable upon approval of applicant's project by the investment committee leaving the balance of the "good faith" deposits due when the lease documents are executed.

Additional information of the SBA 502 program and the local development companies who administer it are available from local Small Business Administration offices.



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Again quoting Colonel Martino: "Present technological forecasting methods are certainly more reliable than is a blind guess, or the assumption that nothing will change. On the other hand, they are far from giving absolute certainty. Indeed, probably no forecasting method will ever give absolute certainty. Probably the best index of reliability is the extent to which existing methods are able to take into account all existing and relevant information on the topic to be forecast."

The methods of forecasting range from simple to very sophisticated. They can apply to broad predictions on the effects of technology on society and to narrow, detailed studies of one technological area. The methods can also be categorized as follows:

Consensus Forecasting uses the combined judgments of several people with knowledge of the specific technical area studied. The accuracy of this method depends on the quality of the expert opinions.

Individual Forecasting is a technique used by a single, open-minded individual who is an expert in his particular field.

Panel Forecasting brings together a specific group of experts who provide an interaction of ideas and predictions.

Delphic Forecasting is a technique which systematically solicits expert opinion. There is no direct confrontation or committee activity, which reduces the influence of psychological factors such as persuasion or majority opinion.

Research and Development programs constantly require funds; and as costs continue to rise, accurate forecasting can play an important role in determining which programs should be pursued. In areas where large amounts of resources are being risked, and the pace of change is rapid, accurate forecasting can be critical to a company's survival.

Data gathering is essential to good forecasting. It is not possible to predict performance in a given area without having accurate knowledge of past performance, measured at regular, frequent intervals under varying conditions in different places. Data must be standardized and validated. Influential factors must be studied for their affect on trends. A long-term approach is essential. Forecasting is ineffective when done by individuals with pressing problems to solve, special interests to promote, or schedules to meet.

An expert in the forecasting field, Ralph C. Lentz Jr., says an organization should ask itself three basic questions: "What is the fundamental business of the organization now?" "What changes will take place?" "What business does the

organization want to be in?" When undertaking technological forecasting for the first time, an organization should select the simplest method, establish guidelines, and monitor carefully to ensure that each forecast meets the same standards.

Forecasting can be used to identify potential problems, to support judgments, and to express ideas with clarity. It must be credible and specific. It must cover a sufficient time span and be stated in both narrative and graphic form. The forecasting must have the support and commitment of everyone from the top down.

A good forecast is only as good as the professional judgment of the forecaster, and this should be a technical judgment, not a value judgment. The forecast should show trends, possibilities, probabilities, pitfalls, contingencies, limitations, and problems. It is important to differentiate between what will occur and what could occur in the future. Pinpointing the need is often a stimulus to the inventive process, and it is possible for accurate forecasting to alter future trends, which in effect causes the predicted changes to occur.

One of the arguments against technological forecasting is the impossibility of predicting breakthroughs. Such events, like the discovery of lasers, are rare and they seldom cause sudden changes in systems and applications. Systems evolve slowly. Most research is tedious work, with many frustrations and slight gains. Although breakthroughs cannot be predicted, effects can be estimated.

The time lag for implementing a new science is customarily about 25 years. The period for technological forecasting should be long enough to allow management to plan for meeting or altering the conditions predicted. Depending on the technical field and the industry, the forecasted period can vary from five to twenty years, with most experts recommending the longer term.

As stated earlier, there seems to be no alternative to forecasting for technical organizations which want to grow in a dynamically changing environment. There is one thing that is always important to consider: if your organization does not plan carefully for the future, your competitor probably will.



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People in the News

HAROLD WEINSTEIN has joined International Rectifier Corporation, El Segundo, California, in the newly created position of Manager of Opto-electronic Projects. Weinstein will oversee the development and marketing of a complete line of opto-electronic components for detectors, assemblies and systems for the computer, photographic, optical encoder, solar cell and such special instrumentation markets as pollution control, water purification and beverage processing. He has been with the semiconductor industry for 20 years.

JIM HITCHIN's promotion to Vice President has been announced by Hydro Products. He will continue in his capacity as General Manager of the Products Division where he is responsible for all operating aspects of that division. At Hydro Products, Hitchin served successively as Assistant General Manager and Sales Manager. As Sales Manager he was directly responsible for nearly doubling Hydro Products' export sales. As a result of this expansion, Hydro received the Presidential "E Award" for Export Excellence in 1973.

R. WILLIAM LEAP has been appointed Regional Marketing Manager of Photographic Sciences Corporation for the Midwest. He will be responsible for the sales of all company products and will headquarter in the Chicago sales office. Leap joined Photographic Sciences Corporation in 1974. His most recent assignment has been Product Manager for overlays used in office copiers, duplicators and computer printout systems.

O. G. HEINEMANN has been elevated to the post of Senior Vice President of Ehrenreich Photo-Optical Industries, Inc. Heinemann, who has been with the company since 1956, will devote a greater portion of his time to the Unitron Company which was acquired in 1974; he will also be an advisor to the Nikon Instrument Division of EPOI.

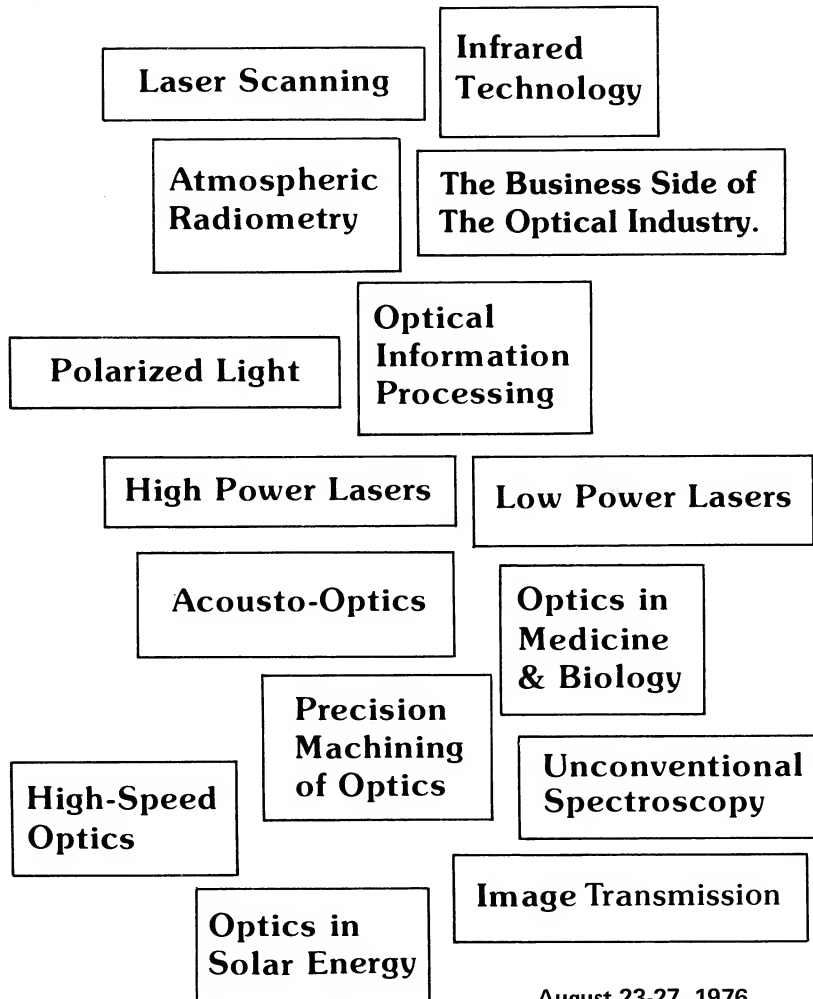
MINORU OHNISHI has been promoted to Managing Director of the International Division, Fuji Photo Film Co., Ltd. Ohnishi, a member of the Board of Directors of Fuji, was named Manager of the International Division in 1969. He has been with the firm for 28 years.

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SHORT COURSES

THREE-DAY SHORT COURSE, Laser Beam Information Systems, October 23-28, 1976, University of Chicago. This specialized seminar covers the growing application of laser technology in image and data manipulation in the form of scanning, transmission, reproduction and control. The material is prepared to transport the student through the principles and practice of basic elements in the laser beam information system, in preparation for direct adaptation to such fields as facsimile, computer optical memory, remote target identification, reconnaissance, photocomposition, and image manipulation. Emphasis will be placed on the creative and innovative manipulation of this mushrooming technology, culminating in the synthesis of real operational systems. The principles and practical aspects of the technology and its utilization will be emphasized with little dependence upon mathematical formalism. Creative and innovative participation will be instilled, directed toward real system problem-solving. The seminar is intended for technical management and marketing professionals, together with advanced engineering and research personnel at the operating level of component development and system research and synthesis. The program is also geared to members of allied professions, such as optics, electronics, communications, graphics, and computer storage and display. For further details write The University of Chicago, Center for Continuing Education, 1307 East 60th Street, Chicago, Illinois 60637.

ONE-WEEK SHORT COURSE, Machine Processing of Remotely Sensed Data, will be offered one week per month from July, 1976 to June, 1977 at Purdue University. The Laboratory for Application of Remote Sensing (LARS) is offering the course to aid potential users of remote sensing and it will include the fundamentals of remote sensing, the physical concepts behind it, data acquisition and analysis techniques plus current applications. Offering this course monthly results in greater flexibility in enrollment and limited class size of fifteen. For further information write LARS Short Course in Remote Sensing Technology and Applications, Continuing Education Business Office, Room 110, Stewart Center, Purdue University, West Lafayette, Indiana 47907.

POSITIONS AVAILABLE

Marketing Manager for Interferometer Product Line. Qualified candidate must have an in-depth knowledge of interferometry and general experience with optical fabrication and testing. The ability to organize and write technical sales literature is a must. He should be able to speak well and write proposals. Must be willing to travel extensively. Directly related marketing experience is desirable but not essential. This is an unusual opportunity for an industrious self-starter. Connecticut headquarters preferred but West Coast office being considered. Send resume with salary history to: Zygo Corporation, Laurel Brook Road, Middelfield, Conn. 06455 Attn: Personnel Manager.

This column is offered free to members of SPIE, subscribers to Optical Engineering, and recipients of this Bulletin. Upon request, listings for Positions Available and Positions Wanted will be handled in confidence by assigning a SPIE Code number through which replies will be forwarded. SPIE reserves the right to edit to fit available space and to exclude reference to race, creed, color as conditions of employment. Write your ad exactly as you want it to appear. DO NOT send a resume. Mail ad copy to Optical Engineering Bulletin, Professional Placement, Box 1146, Palos Verdes Estates, CA 90274; mail replies to the SPIE Code number at the same address.

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Director of Research & Development, Optical Research Instrument Manufacturer. To continue its rapid growth of over \$3,000,000 sales annually, Oriel Corporation needs an experienced, creative, person to take complete responsibility for an expanding research and development program. He must create a continuous stream of new products and work with the engineering staff to market these products. In-depth knowledge of general optics is essential, plus specific experience in one or more of the following areas: interferometry, radiometry, spectrometry, or laser research. The ability to organize and write technical sales literature is a must. Write: The President, Oriel Corporation of America, 15 Market Street, Stamford, Connecticut 06902.

Electro-Optical Engineer with management potential to run a Fiber Optics Program. Must have college degree or equivalent; experience in design and building of hardware, and some knowledge of the communications market. Position located in Southern California. SPIE Code No. OEB/F-4.

Engineering Manager. Portage Inc. is looking for an Engineering Manager in the graphics art sector who likes a challenge (forming an engineering group.) Must work with management in design, prototype, and production scheduling. Helpful to have knowledge of lasers, and microprocessors. Portage is a small company (6KK, sales) but the starting wages are very good. Please write: The President, Portage, P.O. Box 5500, Akron, Ohio 44313 (216) 929-4454.

Manufacturing Manager. Fortune 500 company has opening for manufacturing manager to be responsible for coordination of medium sized precision optical manufacturing facility, personnel and operations. Need high powered individual with minimum 10 years management, supervisory experience in manufacturing of precision optics. Degree in optics related field and/or business administration preferred. Looking for a growth and profit oriented person who is willing to accept a key position in organization. Excellent benefit package. Write SPIE Code No. 76-4-2.

Optical Engineer. Unique opportunity for an Optical Engineer for small, growing West Coast firm. Design of unusual optical elements and systems utilizing skills in first order optics, Gaussian optics, computer programming and solid grasp of higher math. Skills are more important than experience. All inquiries answered. Contact Ken Armstrong, Gary Nelson & Associates, Inc., 10050 N. Wolfe Road, Suite 275, Cupertino, CA 95014, (408) 255-7400).

Optical Sales Engineer. West Coast corporation has immediate opening for experienced Sales Engineer. Qualifications should include a working knowledge of optical components, testing, and coatings. Background or experience in sales and proposal preparation to industrial, aerospace, and military agencies would be an asset. Our capabilities include design and manufacture of reflective and refractive lens systems and components both massive and small with particular emphasis toward aspherical surfaces. This is a well established leading company with an excellent reputation in its field. Please send your resume outlining your experience and salary history to: SPIE Code No. 76-3-5.

Optical Shop Manager. Must be experienced in unit and short run production of precision optics and related testing. SPIE Code No. OEB/F-5.

Optical Thin Film Technician/Engineer with experience in broadband visible and laser coatings needed by established Southern California firm. Key position in development of new coating products. Exotic Materials, Inc., 2968 Randolph Ave., Costa Mesa, CA 92626 (714) 545-9425.

Optics Manager. Want to be the resident expert who is responsible on all programs for optical design? We are seeking a technical leader to direct a group of experienced optical engineers in the analysis, design, and testing of optical systems for the state-of-the-art satellite and airborne systems. This group is heavily involved in all aspects of company research, systems definition and design of: laser pointing systems; IR scanning, imaging, reconnaissance, and earth resource systems. Must have an advanced degree in Optics or Physics and a strong desire to lead.

Optics Engineers. We are seeking individuals with recent advanced degrees in Physics or Optics. Applicants should be familiar with both geometrical and physical optics and be capable of using and writing computer programs. Positions available range from conceptual design to hardware system implementation. Send complete resume to: M. A. Ehrlich, Employment Manager, Aerojet ElectroSystems Company, P. O. Box 296-OE, Azusa, California 91702 (An Affirmative Action Employer.)

Physicist or Optical Engineer wanted to work in photometry/radiometry for growing, established company. Will be responsible for building and maintaining first-class photometry/radiometry calibration lab; also work on new product development in spectroradiometry, ultraviolet and infrared detection, etc. Requires B.S. in Physics or Optical Engineering and work experience in photometry/radiometry. Experience in spectroscopy, optical design, computer usage or electronics is desirable. Send complete resume, including salary history, to Director of Engineering, Photo Research, Division of Kollmorgen Corporation, 3000 North Hollywood Way, Burbank, California 91505.

Sales Engineer. An immediate opportunity exists for an engineer or physicist interested in sales and marketing of optical detectors and electro-optical computer peripherals. Background or experience in multiplier phototubes or television camera tubes would be an asset, as well as experience in sales to government agencies. Send resume to H. K. Yingling, Mktg. Mgr., EMR Photoelectric, Box 44, Princeton, N.J. 08540 or call collect (609) 799-1000.

Sales Engineer. Experience with sale of lenses and optical systems to OEM accounts. Territory will include 11 Western states. Salary and Commission. Send resume with educational background, positions held in past and references to SPIE Code No. 76-3-4.

POSITIONS WANTED

Director of Marketing or Sales Manager position sought by former Director of Marketing of international corporation. Was responsible for all domestic and international sales for company which manufactured electro-optical data reduction instrumentation for computer digital image processing. Also Sales Manager for second corporation which produced pattern generators, step-and-repeat cameras, precision measuring comparators, and digital microdensitometers. BA degree from Providence College, Masters Degree from University of Rhode Island, majoring in International Relations and Political Science. Write Optical Engineering Bulletin, SPIE Code No. OEB/M-1.

(Continued on Page 8)

PROFESSIONAL PLACEMENT

(Continued from Page 7)

Electro-Optical System/Project Engineering position sought by electrical engineer with recent experience. Member of technical staff, Jet Propulsions Labs, Technical Manager/Project Engineer on NASA/RADC funded R & D task AVIS (Automatic Visual Inspection System) and electro-optical system designed to replace the human inspector during all phases of integrated circuit manufacture. Project culminated in a feasibility demonstration of the optical system and minicomputer processing of reflectance data. 2 patents issued 9/75. Contract (2) supervision, optical scanner design, high-speed processor, edge detection, template matching, digital and analog system design, supervision. Write SPIE Code 76-3-1.

Electro-Optics Engineering position sought by Project Engineer responsible for R&D in low loss fiber optics, LED and laser transmitters, receivers, passive and active coupling components and optical data transmission systems, since July 1973. Chief Physicist January 1972 to May 1973, responsible for line of ruby, yag and glass laser systems and material processing equipment, proposal writing and presentation, production supervision. Several technical papers and patents on lasers, fiber optics and optical data transmission systems. Ph.D. in Physics from Institute of Science, Bombay University; M. S. in Physics with electronics major from Bombay University. Reply to Optical Engineering Bulletin, SPIE Code No. OEB/M-4.

Engineering Position which includes technical laboratory functions with opportunity to generate new products or new applications wanted by physicist with B. S. degree. Optical systems training and experience. Photometry, color, radiometry, sensor evaluation, instrument design and photographic engineering, including project management. Salary #3 priority. Western U.S. preferred. Write SPIE Code No. 76-3-9.

Experienced Marketing/Contracts Director desires employment in aerospace environment. Available July 1, 1976. Write SPIE Code Number 76-3-6.

Experimental lab or Optical Engineering Super Technician position wanted. Technical hardware engineering experience with optical (IR through UV) and photographic systems. Responsible for technical proposals and prototype development of innovative equipment. Seeking return to position as high level engineering technician in experimental laboratory. Physicist, B. S. degree. Western U. S. location preferred. Salary, third consideration. Write SPIE Code No. 76-3-10.

Imagery Research Position desired. Photographic research and engineering experience in image enhancement, nonsilver films, equipment design, image evaluation and applied physics. Considerable work in diagnostic radiology. Recent MSEE with courses in communication theory. Robert A. Kilgore, 631 Dauphine Street, New Orleans, Louisiana 70112. Phone (504) 586-8797.

Manufacturing Engineer for leading laser firm wishes to improve quality and efficiency in optics fabrication, has hands-on fabrication experience as optician on crystals, glasses, aspheres, custom and high volume, and massive astronomical optics. B.S. applied physics (optics), 1970. R&D to production on assemblies, high-speed polishing, automatic cleaning, and testing techniques. Will develop and write cookbook to best suit your needs. Let's talk over the possibilities. Ready for immediate placement. Write SPIE Code Number 76-3-7.

Marketing, Engineering, Manufacturing, or General Manager. Thirty years experience, largely in optics. A complete generalist, M.E., C Mfg. E. would like to prove what he can do. West Coast location preferred. SPIE Code No. OEB/F-2.

Marketing Manager/Project Manager: Aggressive professional manager with 13 years experience in electro-optics marketing and project management. Currently Marketing Manager for major supplier of OEM and laboratory EO equipment. Previously Marketing Manager for sophisticated lab equipment and Applications Engineer and Project leader for spacecraft control system design studies and equipment. Responsibilities encompass entire marketing spectrum, including sales management (rep. and direct), direct sales, management of international sales, ad and sales literature preparation, customer service, etc. MBA, MSEE, and BSME degrees provide excellent educational background. Phone: (213) 545-4650 or write SPIE Code No. OEB/F-6.

Optical Engineer seeks engineering/management level position working on optical design and actual engineering implementation of commercial, industrial and/or military optical systems and devices. Eleven years of experience in IR and visual optics, including optics testing, spectrometer design, laboratory management, FLIR design & test, and catadioptric photographic systems. M.S. Optical Engineering, U. of R.; B.S. Physics, U.C.L.A. Reply to Optical Engineering Bulletin SPIE Code No. OEB/J-1.

Optical Systems Engineer. Responsible Management, Engineering, or Marketing position desired, with emphasis on Optical Reconnaissance, Avionics, Sensors, and Systems. Background in R&D, design, fabrication, and test of IR (FLIR), high power lasers, trackers, multisensor displays, multispectral sensors, optical photographic and video systems. Additional experience in audio-visual hardware and software for training and educational systems. Over 20 years extensive experience. AB in Physics. SPIE Code No. OEB/F-1.

Optical Technician. Fourteen years experience in grinding, polishing, and inspection of optical components intended for use in optical and electro-optical instruments and devices; capable of handling all types of optical machinery/test equipment used in modern optical shops/laboratories; well acquainted with latest production/inspection techniques. Graduate of a university in India with degree in Science. SPIE Code No. OEB/F-3.

Optical Technician position wanted in factory, research institute, or workshop. Over 6 years experience in grinding, polishing, and inspection of optical/laser components. Familiar with all types of modern optical machinery and tools. Capable of processing sophisticated optics. B.S. degree. Write SPIE Code No. 76-3-8.

Photo-Optical Design Engineer, a specialist in research and development with over 30 years experience, seeks a position in Orange County, California. Chet Wilk, 459 Lenwood Circle, Costa Mesa, CA 92627. (714/646-2087).

Sales/Marketing Manager. Consultant to companies interested in strengthening their sales and marketing programs, including a Fortune 500 company, from March, 1975 to present. Also had experience marketing high technology computer interfaced Electro-Optical, Electro-Mechanical and Photo-Optical Systems to world market. Developed sales programs and selling strategies for state-of-the-art digitally controlled micro-image data recording and information disseminating microfilm systems. Sold to commercial users, industrial OEM's and government agencies. Marketed systems and concepts for application in Graphic Arts, Simulation Training Devices, and Audio-Visual markets. Held various positions as Vice President, Sales and Marketing; Systems Sales Manager; Eastern Region Sales Manager; and National Sales Manager. Willing to travel extensively and relocate. Reply to SPIE Code No. 76-3-3.

Scientific & Technical Photographer position wanted. Currently employed as Scientific and Technical photographer at U.S. Army R&D Test Center, Civil Service, GS-09, 10 years government photography, 18 years total photography, now using still, movie, cctv, for acquiring data from armor and airborne weapon applications. Successful results in photography through use of night-vision devices. Experienced in applications of Milliken with Dearing timing on airborne platforms. Completed 60% of National Camera Repair course. Desires hands-on challenging field work in Rocky Mtn. or desert regions near big game hunting and camping. Single. ASC, SPIE, CAP, Pilot. Resume on request. Write SPIE Code 76-2-2.

Optical Engineering BULLETIN

THE SOCIETY OF PHOTO-OPTICAL
INSTRUMENTATION ENGINEERS

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